Lab Assignment 2 *Corresponding to Topic 3, "Booting & Shutdown"*	**L2**

Main goals

- To understand the computer boot process and tools needed to manage the startup and stop down system services.
- **To keep a record of all the steps followed for solving these practical activities.**

Part 1: System boot and shutdown

1) Make sure that there is at least one initial SnapShot to begin this section. It's very important!!

2) Init process:

a) Modify the system configuration for booting with LILO boot loader. To do this, you have to un-install the GRUB boot loader and install LILO boot loader. After that, you will have to configure it properly (post-installation).

b) Try to boot the system as "single user" from LILO control console. Now, repeat this test without the "sulogin" argument of "single user" boot mode, from the `/etc/inittab` file. Notice what happens next.

c) Rename the kernel file (**`vmlinux-3.2.0-4-xx`**) to `my_vmlinuz` and reboot the virtual machine. What happens? Why? Restore the original name for the kernel.

d) Uninstall the LILO boot loader. Losing the boot loader is a typical situation when the system managers configure the system boot (for example, after installing Windows system).

Now, try to rescue the LILO boot loader using the Debian CD installation (iso):

I) Follow the rescue process and execute the rescue shell.

II) Rescue (re-install) the LILO boot loader.

III) Reboot the virtual machine.

e) Reinstall the GRUB boot loader again and set it as default.

f) Rename (again) the kernel file (**`vmlinux-3.2.0-4-xx`**) to `my_vmlinuz` and reboot the virtual machine. What happens? Why?

g) Solve the problems and boot the system as "single user".

3) **Services management:**

a) **SysV:**

I) Take a new VirtualBox snapshot at this point.

II) Check out to the services being executed.

III) Develop a new service called keylogd for running in only *runlevel* 2. It will use the `logkeys` command to monitor the keyboard events of any user. When system boots, this service will start the keylogging daemon and when system shuts down it will stop the daemon and dump data in `/var/log/keylog.log`. Use the system manual (`$man`) for that command and look at another similar service such as *reboot*.

IV) Modify the system configuration for booting in "run level" 5 (check that the keylogd service is not running).

V) Disable "`CTRL+ALT+SUP`" in the system core to have no effect.

VI) Install the `bootchart` software. Use it for analyzing boot process performance.

b) **SystemD:**

I) Revert to the snapshot taken in the previous section.

II) Install and configure **systemd** as the init system.

III) Develop the keylogd service, now for systemd.

IV) Check the `systemd-analyze` software is installed. Now, use it for analyzing boot process performance.

V) Compare both systemd-analize and bootchart results.

4) **Boot system security:**

   a) Everyone has to change the “root” user password. Keep it secret.

   b) Try to login to the virtual machine of your classmate (not knowing the password). Play with the GRUB boot loader console:

      I) Solve the security problems found and boot the system as “root”.

5) **Restore the initial state of the virtual machine using the previous snapshot.**

Part 2: Shell scripting

1) **Modify the rc.local service behavior:**
   - **a)** Make sure that the rc.local service is enabled (to start up) for 2, 3, 4 and 6 run levels.
   - **b)** Now, modify this service to exec the following tasks:
     - **I)** Print in standard output (console) the virtual machine hostname, the running kernel version, the current run level and a list of the services which has been started on boot.
     - **II)** After that, shut down the virtual machine.

2) **Create a shell script that takes tree parameters; name of one service, run level and operation ("on" to enable the service in the run-level and "off" to disable it). With these data, the script will be able to enable or disable the service on the run-level passed as argument. That script should be independent of the service manager established in our system (systemd/sysv).**